(3.3) Factored Form of a Quadratic p. 150

- How to determine the zeros from an equation
- Given the zeros, determine the Quadratic equation in Factored Form

THINK: If 2 numbers are multiplied and equal '0' discuss the value of the numbers

ab = 0

Factored form of a quadratic relation is

$$y = a(x-r)(x-s)$$

- the ***x*- intercepts** are r and s (**see note below)
- the equation of the **axis of symmetry** $x = \frac{s+r}{2}$
- the **direction of opening** is determined from a (if $a < 0$, y opens down; if $a > 0$, y opens up)

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Example 1: Given the quadratic equation $y = -3(x-4)(x+6)$ determine,

a) the direction of opening

b) the y-intercept

c) zeros

d) axis of symmetry

e) vertex

f) sketch the graph

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Example 1: Given the quadratic equation $y = -3(x-4)(x+6)$ determine,

a) the direction of opening

down = a value => - 3

b) the y-intercept

sub in x = 0

$y = -3(0-4)(0+6)$

$y = -3(-4)(+6)$

=> y = 72

(0, 72)

c) zeros

$y = a(x-s)(x-r)$

$y = -3(x-4)(x+6)$

s = 4 r = -6

$y = -3(x-4)(x-(-6))$

d) axis of symmetry

$\frac{r+s}{2} \Rightarrow \frac{4+-6}{2} = \frac{-2}{2} = -1$

x = -1

e) vertex

vertex (-1, 75)

$y = -3(x-4)(x+6)$

$= -3(-1-4)(-1+6)$

$= -3(-5)(+5) = +75$

f) sketch the graph

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Example 2: Given the parabola on the right, determine

a) the zeros

b) the equation of the axis of symmetry

c) the vertex

d) determine the equation of the parabola, in factored form

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Example 2: Given the parabola on the right, determine

a) the zeros

s = -4

r = +5

b) the equation of the axis of symmetry

$x = \frac{s+r}{2} = \frac{-4+5}{2} = \frac{1}{2}$ $x = \frac{1}{2} = 0.5$

c) the vertex

(½, 5)

x y

$y = \frac{-1}{4}(x+4)(x-5)$

d) determine the equation of the parabola, in factored form

$y = a(x-r)(x-s)$

$y = a(x+4)(x-5)$ (0, 5)

x y

$5 = a(0+4)(0-5)$

$5 = a(4)(-5)$

$5 = a(-20)$

$\frac{5}{-20} = \frac{a(-20)}{-20}$

$-\frac{1}{4} = a$

$y = -\frac{1}{4}(x+4)(x-5)$

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Example 3: Given zeros at 3 and 7,

a) find the equation of the relation:

b) sketch the graph of the relation:

c) are the zeros enough information?_____

d) why/why not?

i) graphically:_____

ii) algebraically:_____

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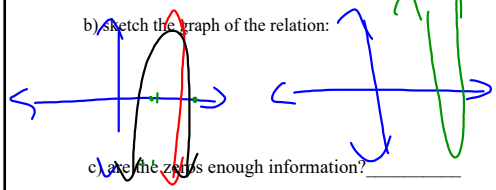
Example 3: Given zeros at 3 and 7,

a) find the equation of the relation:

$r = +3$ $y = a(x-r)(x-s)$

$s = +7$ $y = a(x-3)(x-7)$ $x=5$

b) sketch the graph of the relation:



c) are the zeros enough information?_____

either = a value
another point !

d) why/why not?

i) graphically:_____

ii) algebraically:_____

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Example 4:

a) Find the equation of the parabola, in factored form, if a = -2 and the x-intercepts are 8 and -6.

b) Find the vertex of the parabola.

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Example 4:

a) Find the equation of the parabola, in factored form, if a = -2 and the x-intercepts are 8 and -6.

$y = a(x-r)(x-s)$

$y = -2(x-8)(x-(-6))$

$y = -2(x-8)(x+6)$

b) Find the vertex of the parabola.

$\frac{r+s}{2} = \frac{8+-6}{2} = \frac{2}{2} = 1$

$y = -2(x-8)(x+6)$

$y = -2(1-8)(1+6)$

$y = -2(-7)(7)$

$y = +98$ (1, 98)

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Example 5:

The *x*-intercepts of a parabola are 0 and 7 and it passes through the point (2, -30). Determine,

a) the equation of the parabola, in factored form.

b) the vertex.

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Example 5:

The *x*-intercepts of a parabola are 0 and 7 and it passes through the point (2, -30). Determine,

a) the equation of the parabola, in factored form.

b) the vertex.

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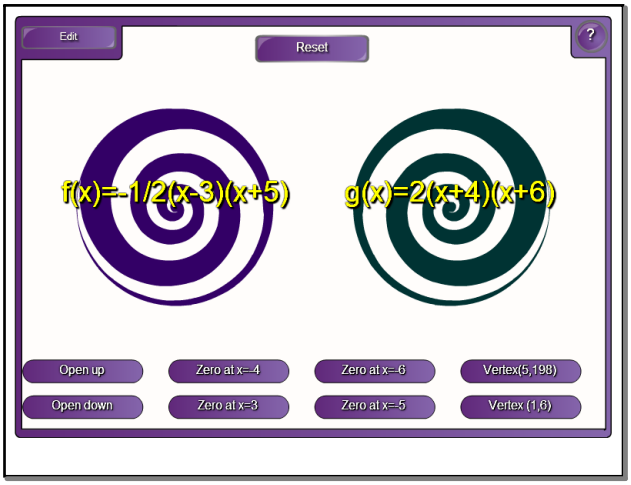
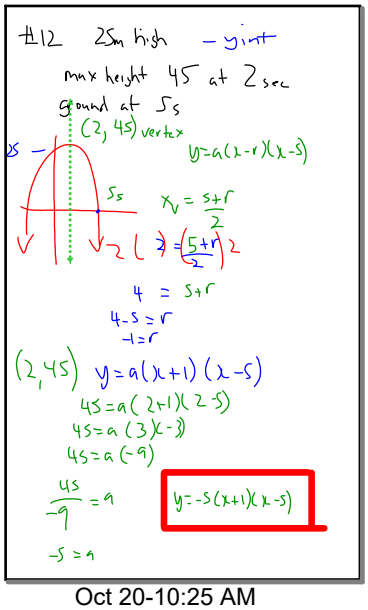


Oct 1-9:00 AM

Homework

Pg. 155 # 1, 2, 4,5, 7, 8, 9, 11, 12

Mar 28-11:06 AM



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